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SALTING PRACTICES IN EXPRESS FAN CARS LOADED WITH PACIFIC NORTHWEST CHERRIES

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SALTING PRACTICES IN EXPRESS FAN CARS LOADED WITH PACIFIC NORTHWEST CHERRIES

Object

This test was conducted to obtain information on the salting practice necessary to insure adequate refrigeration of sweet cherries moving to market under standard refrigeration in express service with fan-equipped cars. While the percentages of salt to be added to the bunker ice in 40 ft. fan cars of cherries under freight service was determined in 1946 1/ the advent in the last 2 years of 50 ft. fan cars designed for transit at express train speeds has made it necessary to determine whether the older recommendations might require revision. Due to the customary use of dry ice to provide CO_2 gas for treatment of cherries during shipment, the retention of CO_2 gas in these cars also needed to be determined.

Outline of Test

Cars:

The four Railway Express Agency fan cars used in this study had sliding doors of the type built between September, 1947 and March, 1948. They were all similar in construction, with interior dimensions 42 feet long, 8 feet 2-1/2 inches wide, and 7 feet 3 inches high including the 7-1/2 inch herringbone floor rack. Walls were plywood lined, without racks or flues on the inside, welded steel sheathed on the outside. Both walls and roof contained 4 inches of Fiberglass plus Silvercote reflector paper for insulation. The floors were insulated with 4-1/4 inches of Naturzone hair-base slabs.

Total capacity of the end ice bunkers in these cars was 12,900 lbs. of chunk ice, or 73 lbs. to the inch of height. The top bunker opening was 12 inches high. The bottom opening did not extend above the floor racks.

The four cars were used as follows:

Car No.	Designation	Salting Practice
REX 6554	A	1% initial salt, 1% all re-icings plus 1000 lbs. dry ice.
6362	B	1% initial salt, 1% all re-icings
6100	C	2% initial salt, 2% all re-icings
6131	D	3% initial salt, 3% all re-icings

1/ Gerhardt, Fisk, and Ryall A. Lloyd. "Salting practices in fan and overhead basket bunker cars loaded with precooled cherries". U. S. Office Report No. 173. 1946.

Temperature Equipment:

Distant reading resistance thermometers were placed in the lugs of cherries in such a way that temperatures in 12 comparable locations in each car could be ascertained without opening the cars. They were located in the head-end half of the load in the following positions.

TBCL - Top layer bunker stack, centerline of the car.
TBSS - " " " " , south side of the car.
MBCL - Fourth layer from bottom of bunker stack, centerline of car.
BBCL - Bottom layer bunker stack, centerline of the car.
TQCL - Top layer 7th stack, centerline of the car.
MQCL - Fourth layer from bottom of 7th stack, centerline of car.
BQCL - Bottom layer 7th stack, centerline of the car.
TDCL - Top layer 14th stack (at doorway), centerline of the car.
MDCL - Fourth layer from bottom of 14th stack, centerline of car.
BDCL - Bottom layer 14th stack, centerline of the car.
TDSS - Top layer 14th stack, south side of the car.
BDSS - Bottom layer 14th stack, south side of the car.

Temperatures at these locations were taken whenever the train stops permitted; they are recorded in tables 2, 3, 4 and 5, and in graphic form in figures 2, 3, 4, 5 and 6.

In addition, a Ryan recording thermometer was installed under the floor racks in the centerline doorway position in cars A and B. Both of these cars received 1% salt, but car A received 1000 lbs. of dry ice after loading, 850 lbs. of which was left in cartons and placed in the bulkhead cribbing and 150 lbs. was broken up on the water ice in the bunkers. Nine of the cartons were placed on the top of the cribbing, level with the top of the load, and 9 were placed on a shelf 11 inches above the floor racks, the usual procedure in commercial shipments when dry ice is used. Alternate cartons were opened. Samples of air were removed from the interior of the car by means of 1/4 inch copper tubing and carbon dioxide concentrations in this air were determined by means of a Hays analyzer (table 2).

Loading and Transit Data:

Methods, time, and other pertinent loading data are given in table 1.

Outside air temperatures were taken at frequent intervals throughout the test. These are plotted in figure 1, and daily maximums and minimums appear in figures 2, 3, 4, 5, and 6.

A record was kept of running time and delays. This information is listed in table 6, and is presented in graphic form in figures 2, 3, 4, and 5.

The ice supplied at each re-icing point was recorded. Bunkers were replenished under supervision of the test party. Salt was weighed out and added to the ice by the test party. Amounts of ice and salt used at the various icing stations are recorded in table 7.

Test Fruit:

The day before the test cars were loaded, Bing cherries from one grower lot were composited and packed in 8 tared 15 lb. lugs. Net weights were recorded for all boxes and the fruit was held at 31°F. until loaded. As each car was loaded one of these weighed test boxes was placed in the load at the top-, and one at the bottom- centerline doorway positions immediately adjacent to the lugs containing thermometers. The gross and tare weights of test boxes in cars A and C were determined again within 30 minutes of the time the cars were opened for unloading (table 9). Those in car D, since scales were not available, were kept under refrigeration until unloading was completed then were taken by automobile to the Market Disease Laboratory in New York City and stored at 45° the night of June 27. Those in car B were handled in the same manner the following evening. The boxes from both cars were given their final weighings the morning of June 29. The weight of the boxes from car D were noted when they went into storage, and since there was less than 5 grams change in that weight by June 29 the delay before the final weighing was not considered to have changedthe weights significantly. After the weighings the cherries were examined for possible differences in appearance.

Car unloading data are listed in table 8.

Results

The test cars were initially iced the afternoon of the day before loading (table 7). It was planned to re-ice and initially salt them the following morning before being moved to their loading points, but it was necessary in the case of car D to omit the first re-icing; however, salt was added by the test party during the time the car was loaded. All cars were again iced and salted prior to departure the morning of June 23.

Car D left the test at Chicago for Long Island R.R. delivery via the Pennsylvania R.R. It will be noted on the icing record that only 5900 lbs. of ice remained in the bunkers when it was unloaded at Maspeth. This and the fact that no record of a re-icing of this car can be found are grounds for the assumption that, despite billing instructions, this car was not re-iced after leaving Morton Park, Chicago.

Cars A and C were unloaded approximately 4 hours after their arrival in Jersey City (table 8). Car D was not unloaded until the evening of June 27, and car B the evening of the 28th. The latter was given an additional icing in Jersey City on the 27th because of the delay.

A comparison of the temperature tables and graphs for the cars indicates that even 3% salt may not provide desired refrigeration for cherries when loaded warm or only slightly cooled as they were in these test cars. Preco fans, being traction-driven, move the air in refrigerator cars at rates that increase with increasing speed of car travel. The results show, however, that while the speed in transit and shorter terminal delays characterizing express service undoubtedly increase cooling efficiency, this method is not as satisfactory as adequate cooling before shipment (figure 6). When it is necessary to ship warm cherries, more salt is needed than was used in this test.

The slightly better cooling attained where 3 percent salt was used was not shown by changes in weight of the special boxes of test fruit (table 9). Percent weight losses of the cherries varied from 1.3 to 1.9 with no discernable association within or between cars. There was also no difference in the appearance of the fruit from the various cars. The test fruit had the same appearance as that in the commercial shipments. The cherries were firm and bright, and stems, while showing slight shriveling, had only traces of discoloration. The only adverse comment voiced by a receiver was on the presence of frost in top-layer lugs adjacent to the dry ice. Examination revealed that heavy layers of frost form on the outside of the dry ice cartons, and this frost will bridge the space between the upright members of the bracing and appear inside adjacent fruit lugs. This did not occur when the frost contacted the upright members themselves. This shows that an air space of at least 2 inches should be provided between dry ice cartons and packages of fruit.

The dry ice did not appear to benefit the fruit in car A, but that is understandable because as seen in table 2, the carbon dioxide level fell off from 7 percent immediately after loading to a trace in transit. When the car stood in the Chicago yards (table 6) a concentration of 2 percent was built up, but this was soon dispelled when the trip was resumed. Previous work has demonstrated that fan cars that held concentrations of carbon dioxide when standing quickly lost it when moving. 2/ The doors of these test cars could not be closed tightly and air leakage was also noticed around the fan pulleys. The extent to which the carbon dioxide escaped at these and other points is not known.

Refrigeration effects from the dry ice were apparently negligible. Figures 2 and 3 show the bottom layers in the dry ice car (A) did not cool more rapidly than those of car B, and the Ryan records of air temperatures immediately under the floor racks, figure 7, likewise indicate only slight differences once the cars were moving.

The dry ice cartons in car A each contained from 5 to 8 lbs. when the car was unloaded. There was no difference in the amount remaining in cartons that had been opened at loading and those that were left sealed.

Summary

Standard refrigeration with 3 percent salt applications or less did not give desired refrigeration to loads of warm or only slightly cooled Pacific Northwest cherries in these shipments. With fruit loading temperatures of 45 to 55°F., initial and transit salting should be heavier than those used in these tests. Elimination of customary precooling and dependence on cooling by fan cars in transit does not appear feasible with the amount of salt used in this test.

2/ Smith, Edwin, Gerhardt, Fisk, and English, W. Harley. "Report on a transportation trip with sweet cherries in refrigerator cars: influence of the height of load, mechanical circulation of air, and the use of carbon dioxide gas as a supplement to standard refrigeration". B. T. & S. Office Report No. 92. 1942.

The addition of 1000 lbs. of dry ice in the cribbing had little apparent effect on the cooling of the load. The CO_2 gas could not be retained in the car under test

An air space of at least 2 inches should be maintained between the dry ice cartons and boxes of fruit to prevent the frost from appearing inside the lugs

Acknowledgements

Grateful acknowledgement is made to the shippers who supplied the necessary fruit for the test; the Great Northern Railroad for providing the dormitory car used for the entire trip; the Fruit Growers Express Co. for furnishing a representative to accompany the test; H. L. McManus, Agent, Western Fruit Express Co., Wenatchee for arrangements for handling test cars; the Chicago, Burlington and Quincy and Erie Railroads for handling the test cars and the dormitory car; the Railway Express Agency for furnishing an agent to ride from St. Paul to Chicago and another to assist in unloading the cars; and especially to associates from the Bureau of Plant Industry staffs at Wenatchee and New York City for their assistance in general arrangements, loading, and unloading the test cars.

Members of the test party were:

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TABLE NO. 1

CAR LOADING DATA

Car Number	REX 6554 (A)	REX 6362 (B)	REX 6100 (C)	REX 6131 (D)
Commodity	Cherries	Cherries	Cherries	Cherries
Loading Point	Wenatchee, Wash.	Wenatchee, Wash.	Wenatchee, Wash.	Wenatchee, Wash.
Shipper	Northern Fruit Company	J. M. Wade Fruit Company	Columbia Fruit Packers	Wenatchee-Wenoka Growers
Consignee	Krass-Joseph Co.	Krass-Joseph Co. Atlantic Commission Company	E. L. Scotto	Atlantic Commission Co.
Destination	New York, N.Y.	Maspeth, L.I.	New York, N.Y.	Maspeth, L.I.
Routing	GN, CB&Q, Erie	GN, CB&Q, Erie, L.I.	GN, CB&Q, Erie	GN, CB&Q, PRR, L.I.
Date Loaded	6-22	6-22	6-22	6-22
Time Started	1:30 PM PT	2:15 PM PT	4:00 PM PT	10:30 AM PT
Time Finished	5:00 PM	7:00 PM	11:00 PM	7:15 PM
Hours car open	3-1/2	4-3/4	7	8-3/4
Temperatures:				
Outside	82-84°	74-84°	72-78°	78-80°
Commodity				
Average	41.7	43.2	40.2	52.0
Range	34-50	38-46	39-41	40-56
Protection	Tunnel loading	Tunnel loading	Tunnel loading	Tunnel loading
Billed Weight	32,480	28,560	31,413	27,440
No. Lugs	1856	1680	1792	1568
Loading method	29 stacks long 8 rows wide 8 tiers high	28 stacks long 14 stacks 8 high 14 stacks 7 high	28 stacks long 8 high 8 wide	28 stacks long 7 high 8 wide
Stripping	3rd, 6th & top	3rd, 6th & top	3rd, 6th & top	2nd, 4th & top
Space at bracing	22"	38"	38"	33"
Height of load	38"	34-38"	38"	33"
Space above load	41"	41-45"	41"	45"
Top bunker opening	12"	12"	12"	12"

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TABLE NO. 2

Standard refrigeration with 1% salt plus 1000 lbs dry ice

Commodity Temperatures (Degree F.)

Car No REX 6554 (A)

Station	Date	Time	OST	1 EBCL	2 WECL	3 EBSS	4 EBCL	5 EBCL	6 EBCL	7 WDCL	8 EBSS	9 EBSS	10 EDCL	11 ECCL	12 WECL	MAX	MIN	Average Top	Average Bot	Average Mid	Average For car	CO_2 Percent
Loading finished, car doors closed																						
Wenatchee	6-22	5:05pPT	84	395	*420	460	430	440	450	420	415	465	---	465	415	465	395	454	417	418	434	7
Prior to re-icing before departure																						
Wenatchee	6-23	1:30a	62	370	395	465	465	440	480	465	445	490	---	495	460	495	370	477	450	440	451	5
Hillyard		9:00a	70	370	385	430	430	430	465	470	425	470	---	475	460	475	370	454	408	438	437	3
Prior to re-icing																						
Whitefish		5:10pMT	70	390	390	410	400	430	440	465	405	460	---	460	450	465	390	435	408	435	427	2
Havre		11:50p	60	390	385	385	385	410	410	445	380	425	---	425	425	445	380	406	393	418	406	1-1/2
Prior to re-icing																						
Williston	6-24	6:50a	60	390	380	380	375	410	400	440	380	415	---	415	415	440	375	397	393	412	400	1
Minot		11:00aCT	76	390	380	375	370	405	395	430	375	415	---	415	410	430	370	394	390	407	396	1
Breckenridge		5:05p	82	400	385	385	370	400	395	425	380	420	---	420	405	425	370	398	393	405	397	Tr.
Prior to re-icing																						
Willmar		8:00p	78	390	385	390	370	395	395	420	385	425	---	425	400	425	370	401	390	402	398	Tr.
Savanna	6-25	6:50a	72	400	390	390	375	395	400	415	390	420	---	420	395	420	375	401	395	400	399	Tr.
Prior to re-icing																						
Morton Pk., Chi.		10:00a	82	395	395	395	375	400	400	410	400	420	---	420	400	420	395	402	393	402	401	Tr.
After 4 hours standing in sun																						
Erie Yds., Chi.		4:55p	87	390	385	420	390	405	425	410	395	455	---	455	400	455	385	429	397	398	412	2
Marion		11:45p	77	400	395	415	395	405	430	410	410	455	---	450	410	455	395	429	405	405	416	Tr.
Meadville	6-26	7:30aET	77	410	405	405	400	410	430	420	410	450	---	450	405	450	400	427	410	410	418	Tr.
Prior to re-icing																						
Hornell		12:15p	85	410	405	405	400	410	425	415	405	445	---	445	405	445	400	424	408	408	415	Tr.
Arrival in Jersey City																						
Jersey City		8:15p	88	415	410	400	400	410	425	415	410	445	---	445	410	445	400	423	412	412	417	Tr.
Prior to unloading																						
Erie Pier, N.Y.	6-27	12:30aDT	80	405	405	420	405	415	435	415	415	460	--	460	410	460	405	436	412	410	422	-

* The decimal point has been omitted in each instance to conserve space.

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TABLE NO. 3

Standard refrigeration with 1% salt

Commodity Temperatures (Degree F.)

Car No. REX 6362(B)

Station	Date	Time	OST	1 BECL	2 MBCL	3 EBSS	4 EBCL	5 BYCL	6 BYCL	7 EDCL	8 EDSS	9 EDSS	10 BYSL	11 EDCL	12 MYCL	MAX	MIN	Average Top	Bot	Mid	For car
				**					During loading												
Wenatchee*	6-22	4:00p	78	480	500	520	520	490	520	500	495	525	500	515	525	525	480	520	491	508	508
									Prior to re-icing before departure												
Wenatchee	6-23	1:30a	62	---	480	525	525	480	525	495	500	530	495	525	510	---	---	526	492	495	508
Hillyard		9:00a	70	370	450	495	470	465	475	495	485	500	470	500	495	500	370	488	448	480	472
									Prior to re-icing												
Whitefish		5:10pMT	70	405	445	470	455	460	450	485	480	490	455	490	485	490	405	471	450	472	464
Havre		11:50p	60	385	425	420	415	440	405	450	460	445	425	445	455	460	385	426	428	443	431
									Prior to re-icing												
Williston	6-24	6:50a	60	395	435	425	420	450	400	460	460	450	425	445	455	460	395	428	432	450	435
Minot		11:[illegible]aCT	76	405	430	420	415	445	395	450	455	445	420	445	450	455	395	424	431	443	431
Breckenridge		5:[illegible]5p	82	395	430	415	420	440	400	440	455	450	420	445	445	450	395	426	428	438	430
									Prior to re-icing												
Willmar		3:00p	78	400	430	415	425	435	400	440	460	455	420	445	440	460	400	428	428	437	430
Savanna	6-25	6:50a	72	390	420	410	415	430	395	435	460	450	420	445	430	460	390	423	425	428	425
									Prior to re-icing												
Morton Pk.,Chi.		10:00a	82	390	425	405	420	430	395	435	465	455	420	445	440	465	390	424	426	433	427
									After 4 hours standing in sun												
Erie Yds.,Chi.		4:55p	87	380	420	440	475	435	435	440	470	480	430	475	430	480	380	461	428	430	442
Marion		11:45p	77	385	420	440	440	435	425	425	470	455	435	465	430	470	385	445	431	435	435
Meadville	6-26	7:30aET	77	400	425	430	440	430	415	445	490	475	440	470	435	490	400	446	440	433	441
									Prior to re-icing												
Hornell		12:15p	85	410	430	430	435	440	425	445	490	475	440	465	435	490	410	446	445	437	443
									Arrival in Jersey City												
Jersey City		8:15P	88	410	425	420	420	435	420	445	490	475	435	460	435	490	410	439	442	435	439
									Re-iced 11:20a												
Jersey City	6-27	7:45pDT	85	345	390	485	510	440	475	450	465	510	440	505	435	510	345	499	422	425	454
Maspeth	6-28	6:35p	71	340	385	495	515	430	485	450	455	500	440	495	445	515	340	498	416	427	453

* Resistance thermometers in place in load, but loading not completed nor car doors shut.
** The decimal point has been omitted in each instance to conserve space.

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TABLE NO. 4

Standard refrigeration with 2% salt

Commodity Temperatures (Degree F)

Car No. REX 6100 (C)

Station	Date	Time	OST	1 BBCL	2 MBCL	3 TBSS	4 TBCL	5 BBCL	6 MBCL	7 TBCL	8 BBSS	9 TBSS	10 BBCL	11 TBCL	12 MBCL	MAX	MIN	Average Top	Bot	Mid	For car
				***				During loading													
Wenatchee**	6-22	5:30pPT	76	415	415	510	---	440	465	--	400	450	470	520	450	520	400	486	431	432	454
				Prior to re-icing before departure																	
Wenatchee	6-23	1:30a	62	325	380	500	565	435	490	--	430	500	450	520	450	565	325	515	410	415	458
Hillyard		3:00a	70	345	325	435	530	400	445	--	430	485	430	490	430	530	325	477	401	378	431
				Prior to re-icing																	
Whitefish		5:10pMT	70	370	340	400	465	390	400	---	430	460	410	460	405	465	340	437	400	372	412
Havre		11:50p	60	360	330	370	465	370	370	--	425	435	395	435	390	465	330	415	388	360	395
				Prior to re-icing																	
Williston	6-24	6:50a	60	365	330	365	450	360	355	---	415	420	385	425	380	450	330	403	381	355	396
Minot		11:00aCT	76	365	330	365	405*	360	350	--	420	420	385	420	380	420	330	398	382	355	382
Breckenridge		5:05p	82	360	330	365	395	355	355	---	405	410	380	410	370	410	330	387	375	350	376
				Prior to re-icing																	
Willmar		8:00p	78	365	335	370	405	355	355	---	410	410	380	405	370	410	335	389	373	352	378
Savanna	6-25	6:50a	72	360	335	365	405	350	355	--	415	410	380	405	365	415	335	388	376	350	377
				Prior to re-icing																	
Morton Pk., Chi.		10:00a	82	365	335	365	400	350	355	---	420	405	380	405	365	420	335	386	378	350	377
				After 4 hrs standing in sun																	
Erie Yds., Chi		4:55p	87	340	335	400	425	355	380	---	425	425	380	415	370	425	335	409	375	352	386
Marion, Ohio		11:45p	77	370	345	390	435	360	385	--	445	430	385	415	380	445	345	411	390	362	394
Meadville, Pa.	6-26	7:30aET	77	380	345	385	425	365	380	---	450	435	395	420	380	450	345	409	398	364	396
				Prior to re-icing																	
Hornell		12:15p	85	380	350	385	425	370	375	--	455	430	400	425	380	455	350	408	401	365	398
				Arrival in Jersey City																	
Jersey City		8:15p	88	375	345	380	415	365	370	---	455	425	395	420	380	455	345	402	398	362	393
				Prior to unloading																	
Erie Pier, N.Y.	6-27	12:30aDT	80	350	350	395	440	365	380	---	445	430	395	420	380	445	350	413	389	365	395

* Connector found loose upon arrival. This may account for the sudden drop in temperature.

** Resistance thermometers in place in load, but loading not completed nor car doors closed.

*** The decimal point has been omitted in each instance to conserve space.

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TABLE NO. 5

Standard refrigeration with 3% salt

Commodity Temperatures (Degree F.)

Car No. REX 6131 (D)

Station	Date	Time	OST	1 BBCH	2 MBCH	3 BSS	4 BBCH	5 BLCH	6 BLCH	7 MDCH	8 BDSS	9 BDSS	10 BDCH	11 BDCH	12 MDCH	MAX	MIN	Average Top	Bot	Mid	For car
Loading finished, car doors closed																					
Wenatchee	6-22	3:15pPT	82	505*	560	560	535	545	560	525	555	535	545	525	540	560	505	543	533	542	541
Prior to re-icing before departure																					
Wenatchee	6-23	1:30a	62	385	530	580	545	500	575	545	535	565	515	565	525	580	385	566	484	520	530
Hillyard		9:00a	70	390	450	520	495	485	525	545	510	540	505	535	480	545	390	523	472	507	493
Prior to re-icing																					
Whitefish		5:10pMT	70	390	450	480	445	460	480	515	470	505	455	500	465	515	390	482	444	477	468
Havre		11:50p	60	415	435	445	420	440	440	490	465	480	445	475	435	490	415	452	441	453	449
Prior to re-icing																					
Williston	6-24	6:50a	60	410	420	425	400	435	420	475	450	465	430	460	405	475	405	434	431	433	433
Minot		11:00aCT	76	410	420	415	395	430	410	465	445	460	425	455	400	465	395	427	428	428	428
Breckenridge		5:05p	82	415	410	415	390	420	405	455	440	460	420	445	390	460	390	423	424	418	422
Prior to re-icing																					
Willmar		8:00p	78	410	405	410	395	415	410	445	440	460	415	445	390	460	390	424	420	413	420
Savanna	6-25	6:50a	72	410	405	405	395	415	405	440	440	455	410	440	385	455	385	420	418	410	417
Prior to re-icing																					
Morton Pk., Chi.**		10:00a	82	405	405	405	395	410	405	435	435	450	410	435	380	450	380	418	415	406	414
Maspeth	6-27	10:15aDT	90	380	400	485	465	420	495	445	465	500	440	485	405	500	380	486	426	417	449

* The decimal point has been omitted in each instance to conserve space.

** Car was released after re-icing to PRR and LIRR

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TABLE NO. 6

TRIP LOG

Date	Station	Time Arrived	Time Departed	Elapsed Time Hrs. & Mins. Running	Standing
June 23	Wenatchee, Wash.		4:35AM PT		
	Wilson Creek	6:00AM PT	6:05	1-25	0-05
	Hillyard	9:00	9:12	2-55	0-12
	Troy, Montana	12:29PM	1:34PM MT	3-17	0-05
	Jennings	2:15PM MT	2:17	0-41	0-02
	Stryker	4:00	4:02	1-43	0-02
	Lupfer	4:35	4:45	0-33	0-10
	Whitefish	5:05	5:45	0-20	0-40
	Blackfoot	8:28	8:30	2-43	0-02
	Havre	11:45	12:01AM	3-15	0-16
24	Brockton	5:11AM	5:16	5-10	0-05
	Williston, N.D.	6:48	8:20 CT	1-32	0-32
	Stanley	9:49 CT	9:52	1-29	0-03
	Minot	10:54	11:08	1-02	0-14
	Guthrie	12:04PM	12:08PM	0-56	0-04
	N. Rockford	1:10	1:30	0-62	0-20
	Nolan	2:50	2:57	1-20	0-07
	Willmar, Minn.	7:36	9:03	4-39	1-27
	Waverly	10:20	10:35	1-17	0-15
	Lyndale Yds.	11:27	11:31	0-52	0-04
	Mpls. Depot	11:35	11:45	0-04	0-10
25	St. Paul Depot	12:15AM	1:20AM	0-30	1-05
	Savanna, Ill.	6:37	6:58	5-17	0-21
	Morton Park, Chi.	9:49	12:15PM	2-51	2-26
	Erie Yds., Chi	12:44PM	6:16	0-29	5-28
	Huntington, Ind	9:13	9:24	2-57	0-11
	Marion, Ohio	11:45	1:00AM ET	2-21	0-15
26	Kent	4:00AM ET	4:10	3-00	0-10
	Meadville, Pa.	7:30	7:45	3-20	0-15
	Salamanca	10:00	10:13	2-15	0-13
	Hornell, N. Y.	12:05PM	12:50PM	1-52	0-45
	Port Jervis	5:56	6:07	6-54	0-11
	Jersey City, N.J.	8:15	- -	2-08	- -
			Totals	70-9	17-15
			Percent	80.3	19.7

U. S. ... TEST - ...SPECTION [illegible]

Table No. 7

Ice and Salt Record

Station	Date	Time Begun	Time Finished	OST °F	Car Number REX 6554 (A) Ice	REX 6554 (A) Salt	REX 6362 (B) Ice	REX 6362 (B) Salt	REX 6100 (C) Ice	REX 6100 (C) Salt	REX 6131 (D) Ice	REX 6131 (D) Salt
									Initial Icing			
Wenatchee, Wash.	6-22	[illegible]pPT	2:35pPT	75	12900	- - -	12900	- - -	12900	- - -	12900	- - -
									Re-iced		Spotted for loading	
Wenatchee, Wash	6-22	9:10a	9:[illegible]0a	76	1200	129	1100	129	1100	258	before reicing	
" "	6-22	10:25a	10:[illegible]5a	80	- -	- - -	- -	- - -	- -	- - -	Salted at loading	
							Re-iced before departure					387
" "	6-23	1:10e	2:10a	62	300	9	900	9	1600	32	3100	93
									Re-iced			
Whitefish, Mont	6-23	5:15pMT	5:40pMT	70	1400	14	1600	16	1700	34	1200	36
									Re-iced			
Williston, N.D.	6-24	7:00a	7:30a	62	1200	12	900	9	900	18	1500	45
									Re-iced			
Willmar, Minn.	6-24	8:02pCT	8:[illegible]5pCT	74	900	9	1200	12	1100	22	1400	42
									Re-iced			
Morton Pk., Chi.	6-25	10:01a	10:25a	84	1100	11	1400	14	1400	28	1500	48
									Re-iced		Delivered to Penn. RR &	
Hornell, N.Y.	6-26	12:37pET	12:[illegible]5pET	86	2200	22	3100	31	2400	48	LI RR at Chicago	
									Re-iced			
Jersey City, N.J.	6-27	11:20aET	11:30aET	88	- - -	- - -	7000	20	- -	- -	- - -	- - -
									TOTAL SUPPLIED			
			Ice		21800	206	25100	240	23100	440	21700	651
			Dry Ice		1000	- -	- - -	- - -	- -	- - -	- - -	- - -
									ICE AT DESTINATION			
Erie Pier, N.Y.	6-27	12:30a	Ice	80	11200	- - -			11000	- - -		
			Dry Ice		126							
Maspeth, L.I.	6-27	5:00p		88							5300	- - -
" " "	6-28	7:00p		68			3700					
									TOTAL USED			
			Ice & Salt		10600	206	16400	240	12100	440	15800	651
			Dry Ice		874							

U. S. D. A. TEST - WASHINGTON 1949-2

TABLE NO 8

Unloading Data

Car and Designation	REX 6554 (A)	REX 6362 (B)	REX 6100 (C)	REX 6131 (D)
Place	Erie Pier, N. Y.	Maspeth, L. I.	Erie Pier, N Y.	Maspeth, L. I.
Date	6-27-49	6-28-49	6-27-49	6-27-49
Time Beginning	12:30 A.M. DT	Opened for inspection	12:40 A.M. DT	6:00 P.M. DT
Time When finished	3:40 A.M.	8:00 P.M. DT	3:25 A.M.	10:00 P.M.
Outside Temperature Beginning	80°F	68°F. 1/	80°F.	86°F.
Outside Temperature When finished	75°F		75°F.	78°F.

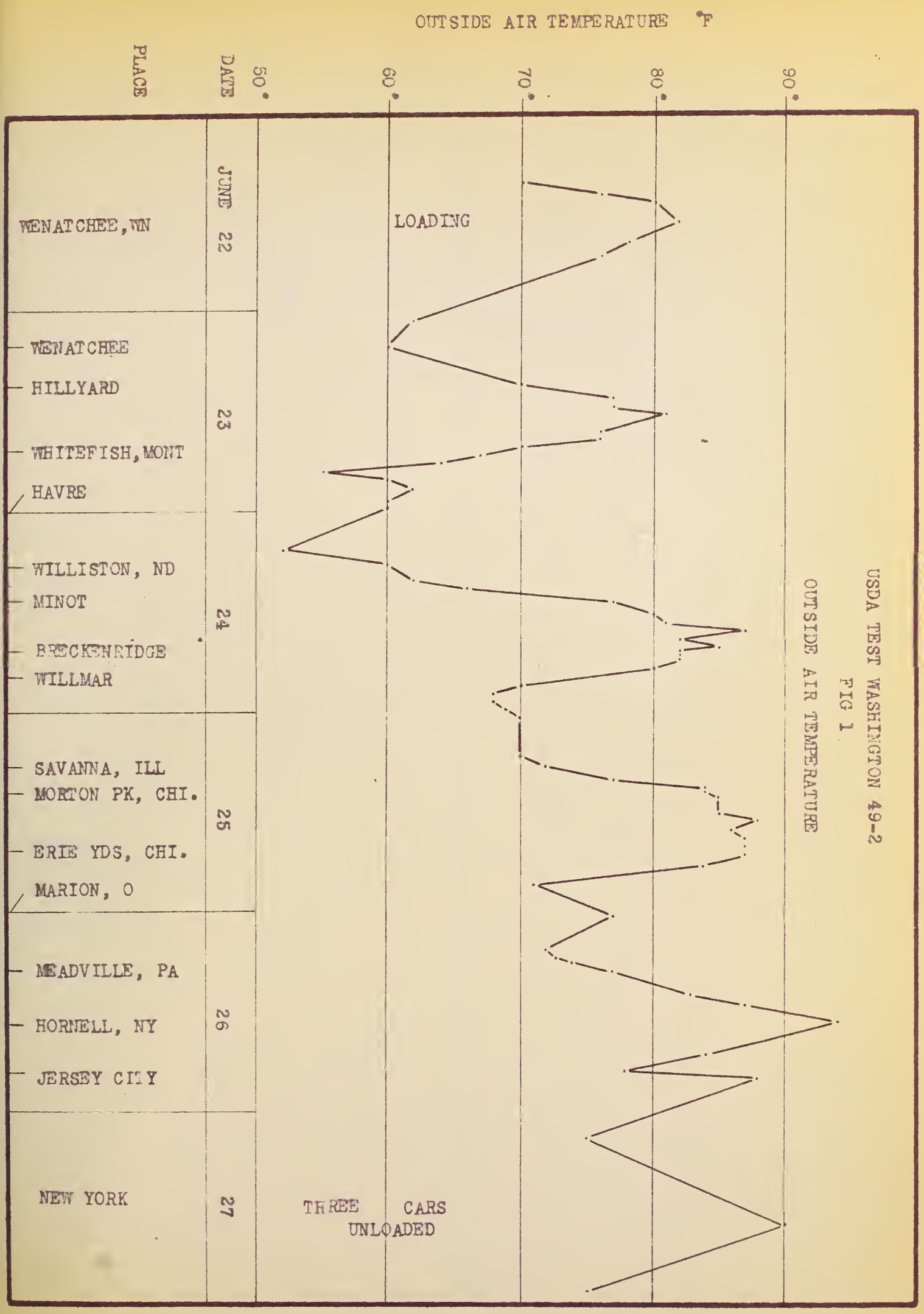
1/ Unloaded later in evening of June 2

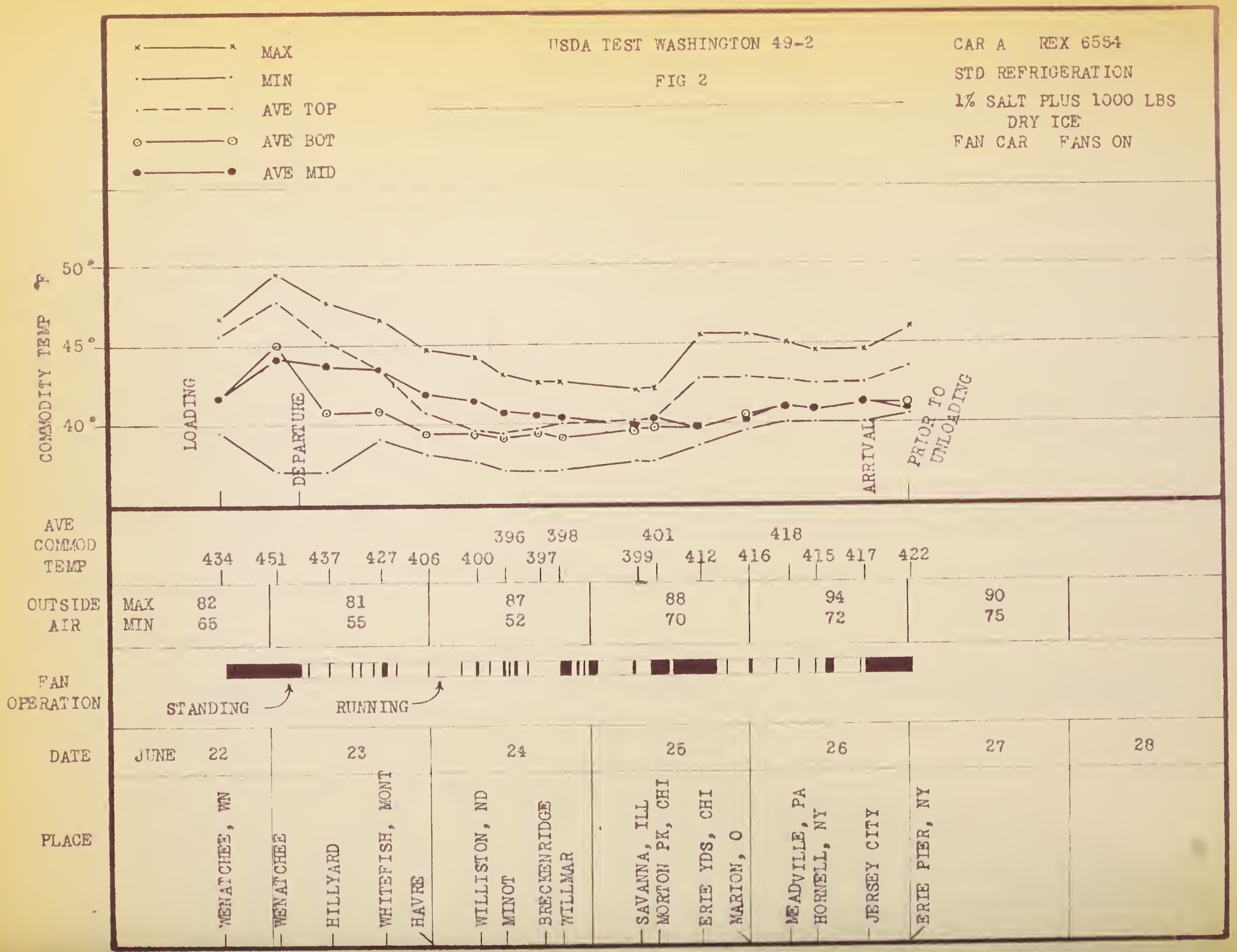
U.S.D.A. TEST - WASHINGTON 1949-2

TABLE NO. 9

Changes in Weight of Cherries and Lugs in Transit

Position	Car No.	Car Treatment	Time Weighed	Percent Weight Gain or Loss		
				Gross	Lugs	Cherries (Net)
BDCL	REX 6554 (A)	1% salt & dry ice	1:00 A.M. 6-27	-0.74	+7.44	-1.63
TDCL	6554 (A)	1% salt & dry ice	1:00 A.M. 6-27	-0.37	+5.13	-1.29
BDCL	6362 (B)	1% salt	9:00 A.M. 6-29	-0.74	+3.36	-1.58
TDCL	6362 (B)	1% salt	9:00 A.M. 6-29	-0.58	+5.64	-1.82
BDCL	6100 (C)	2% salt	1:00 A.M. 6-27	-0.40	+9.77	-1.82
TDCL	6100 (C)	2% salt	1:00 A.M. 6-27	-0.65	+9.04	-1.32
BDCL	6131 (D)	3% salt	9:00 A.M. 6-29	-0.59	+5.60	-1.80
TDCL	6131 (D)	3% salt	9:00 A.M. 6-29	-0.78	+5.04	-1.84

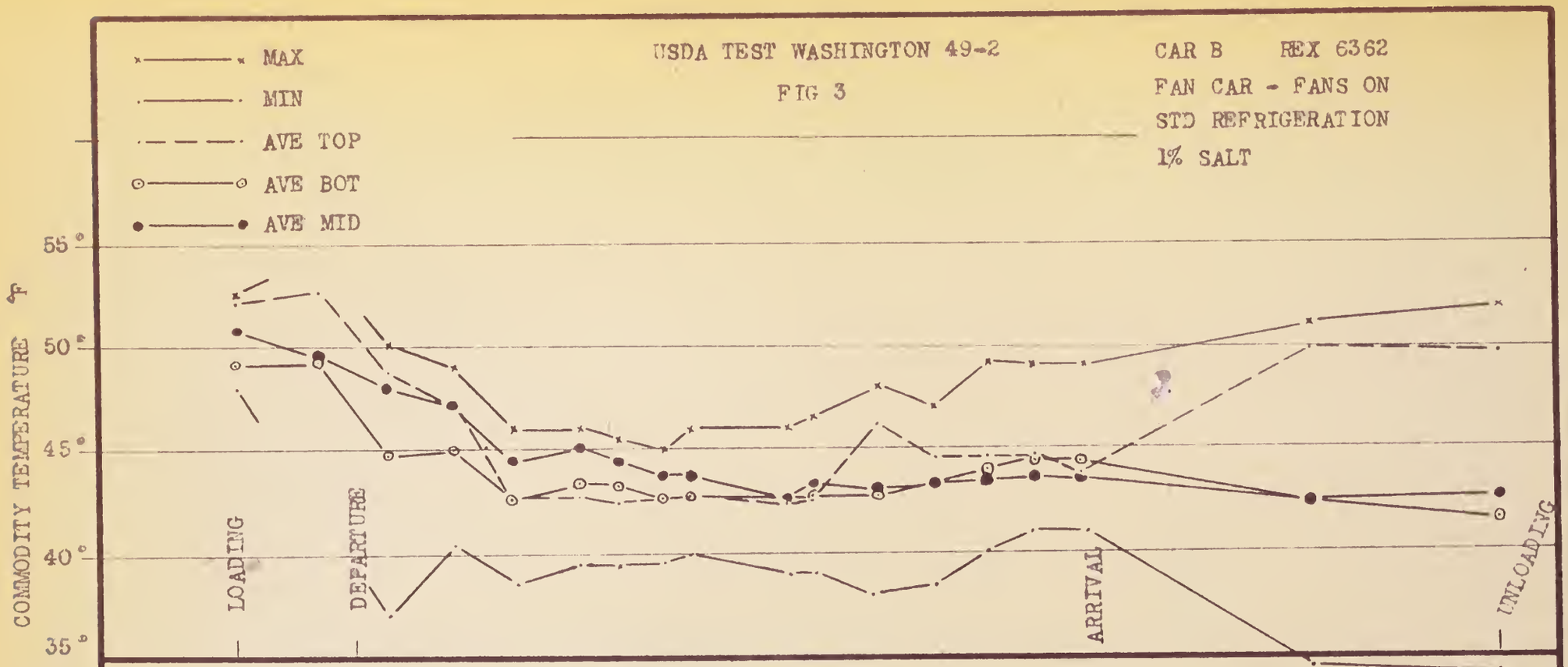

OUTSIDE AIR TEMPERATURE °F
50°
60°
70°
80°
90°
PLACE
DATE
WENATCHEE, WN
JUNE 22
LOADING
WENATCHEE
HILLYARD
WHITEFISH, MONT
HAVRE
23
WILLISTON, ND
MINOT
BRECKENRIDGE
WILLMAR
24
SAVANNA, ILL
MORTON PK, CHI.
ERIE YDS, CHI.
MARION, O
25
MEADVILLE, PA
HORNELL, NY
JERSEY CITY
26
NEW YORK
27
THREE CARS UNLOADED
USDA TEST WASHINGTON 49-2
FIG 1
OUTSIDE AIR TEMPERATURE


MAX
MIN
AVE TOP
AVE BOT
AVE MID
USDA TEST WASHINGTON 49-2
FIG 2
CAR A REX 6554
STD REFRIGERATION
1% SALT PLUS 1000 LBS
DRY ICE
FAN CAR FANS ON
COMMODITY TEMP °F
50°
45°
40°
LOADING
DEPARTURE
ARRIVAL
PRIOR TO UNLOADING
AVE COMMOD TEMP
434 451 437 427 406 400 396 398 397 401 399 412 416 418 415 417 422
OUTSIDE AIR
MAX 82 81 87 88 94 90
MIN 65 55 52 70 72 75
FAN OPERATION
STANDING
RUNNING
DATE
JUNE 22 23 24 25 26 27 28
PLACE
WENATCHEE, WN
WENATCHEE
HILLYARD
WHITEFISH, MONT
HAVRE
WILLISTON, ND
MINOT
BRECKENRIDGE
WILLMAR
SAVANNA, ILL
MORTON PK, CHI
ERIE YDS, CHI
MARION, O
MEADVILLE, PA
HORNELL, NY
JERSEY CITY
ERIE PIER, NY

USDA TEST WASHINGTON 49-2

FIG 3

CAR B REX 6362
FAN CAR - FANS ON
STD REFRIGERATION
1% SALT



AVE COMMOD TEMP	508	508 472 464 431	435 430 431 430	425 427 442	435 441 443 439	454	453	
OUTSIDE AIR MAX	82	81	87	88	94	90	-	
OUTSIDE AIR MIN	65	55	52	70	77	75	68	
FAN OPERATION	STANDING	RUNNING						
DATE	JUNE 22	23	24	25	26	27	28	
PLACE	WENATCHEE, WN	WENATCHEE HILLYARD WHITEFISH, MONT HAVRE	WILLISTON, ND MINOT BRECKENRIDGE WILLMAR	SAVANNA, ILL MORTON PK, CHI ERIE YDS, CHI MARION, O	MEADVILLE, PA HORNELL, NY JERSEY CITY	NEW YORK	MASPETH, LI	

USDA TEST WASHINGTON 49-2. CAR C REX 6100

FIG 4 STD REFRIGERATION

2% SALT

FAN CAR FANS ON

MAX

MIN

AVE TOP

AVE BOT

AVE MID

COMMODITY TEMPERATURE °F

35° 40° 45° 50° 55°

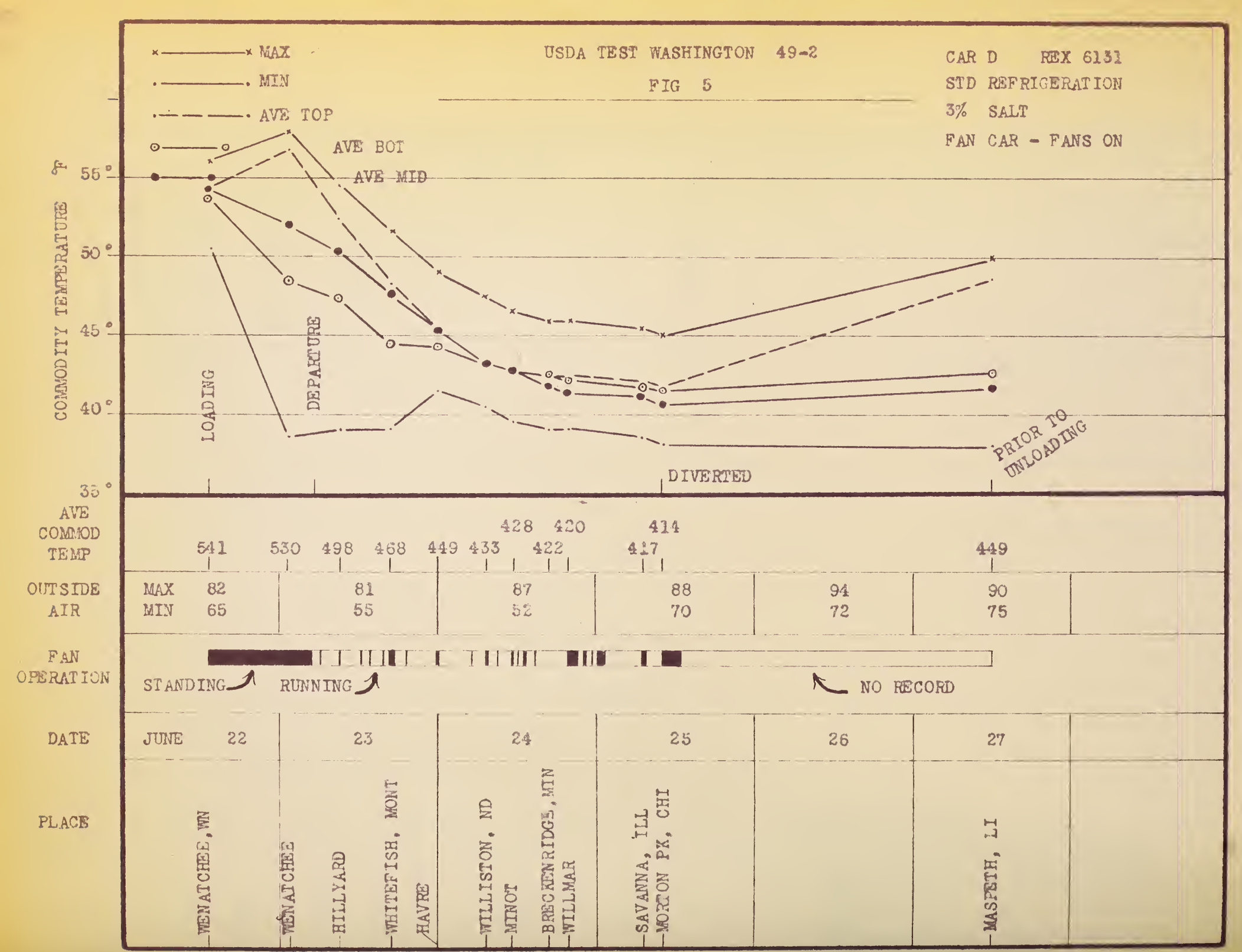
LOADING

DEPARTURE

ARRIVAL

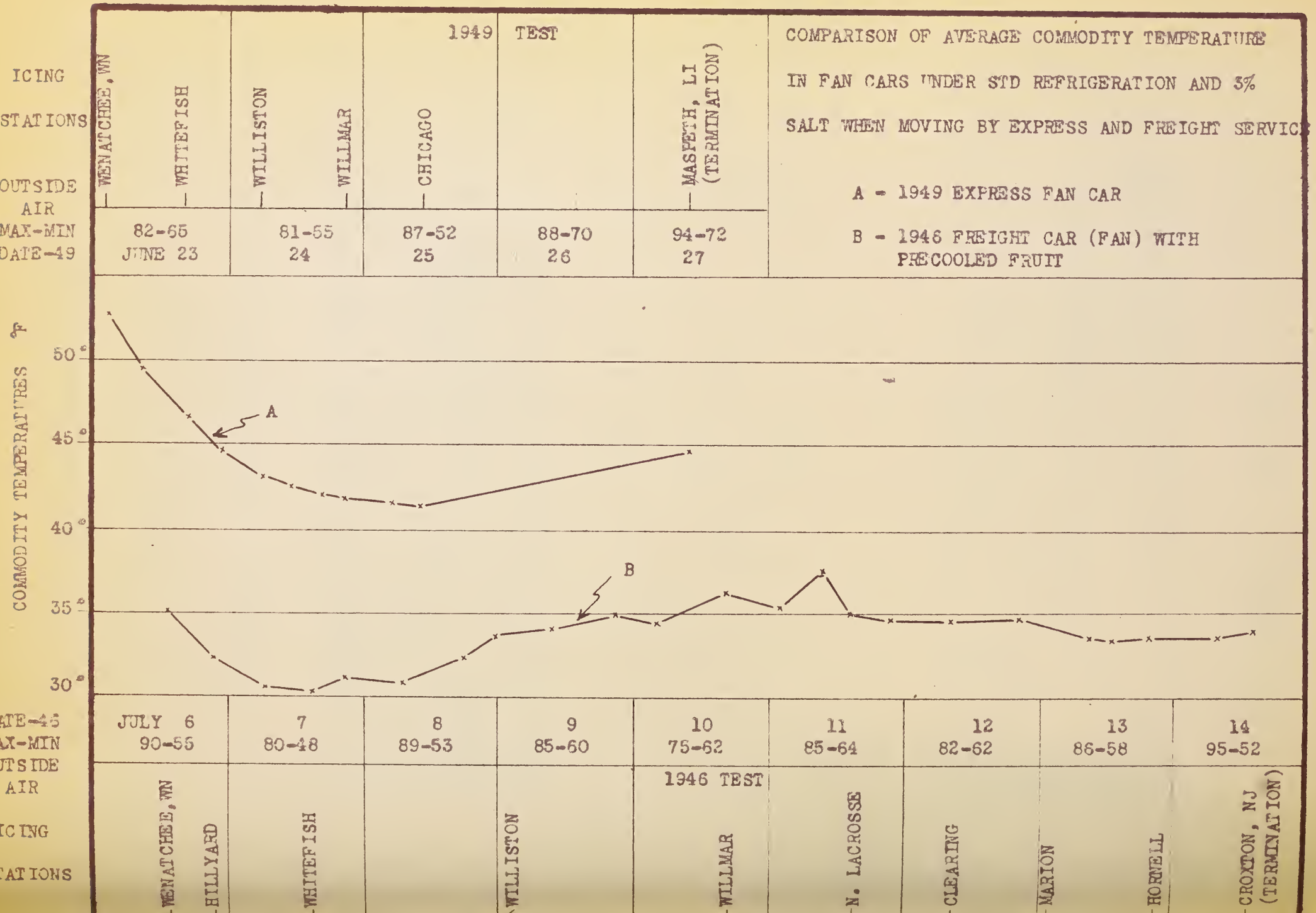
PRIOR TO UNLOADING

PLACE	DATE	OUTSIDE AIR MAX	OUTSIDE AIR MIN	AVE COMMOD TEMP	FAN OPERATION
WENATCHEE, WN	22	82	65	454	STANDING
WENATCHEE				458	
HILLYARD	23	81	55	431	
WHITEFISH, MONT				412	
HAVRE				395	
WILLISTON, ND	24	87	52	386	RUNNING
MINOT				376	
BRECKENRIDGE				378	
WILLMAR					
SAVANNA, ILL	25	88	70	377	
MORTON PK, CHI				377	
ERIE YDS, CHI				386	
MARION, O				394	
MEADVILLE, PA	26	94	72	396	
HORNELL, NY				398	
JERSEY CITY				393	
NEW YORK	27	90	75	395	


USDA TEST WASHINGTON 49-2
FIG 5
CAR D REX 6131
STD REFRIGERATION
3% SALT
FAN CAR - FANS ON
MAX
MIN
AVE TOP
AVE BOT
AVE MID
COMMODITY TEMPERATURE °F
55°
50°
45°
40°
35°
LOADING
DEPARTURE
DIVERTED
PRIOR TO UNLOADING
AVE COMMOD TEMP
541
530
498
468
449
433
428
422
420
417
414
449
OUTSIDE AIR
MAX 82 81 87 88 94 90
MIN 65 55 52 70 72 75
FAN OPERATION
STANDING
RUNNING
NO RECORD
DATE
JUNE 22 23 24 25 26 27
PLACE
WENATCHEE, WN
WENATCHEE
HILLYARD
WHITEFISH, MONT
HAVRE
WILLISTON, ND
MINOT
BRECKENRIDGE, MIN
WILLMAR
SAVANNA, ILL
MORTON PK, CHI
MASPETH, LI

USDA TEST WASHINGTON 49-2

FIG 6



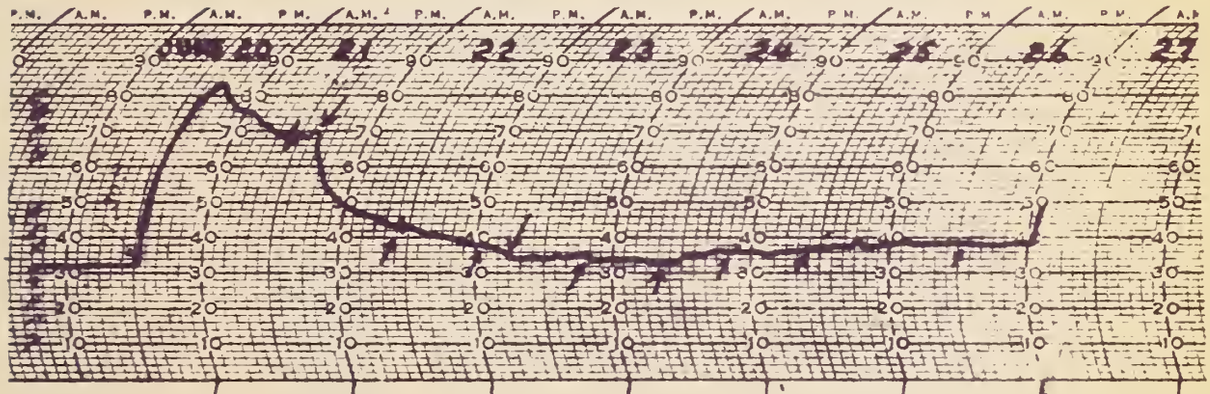
USDA TEST WASHINGTON 49-2

FIG 7

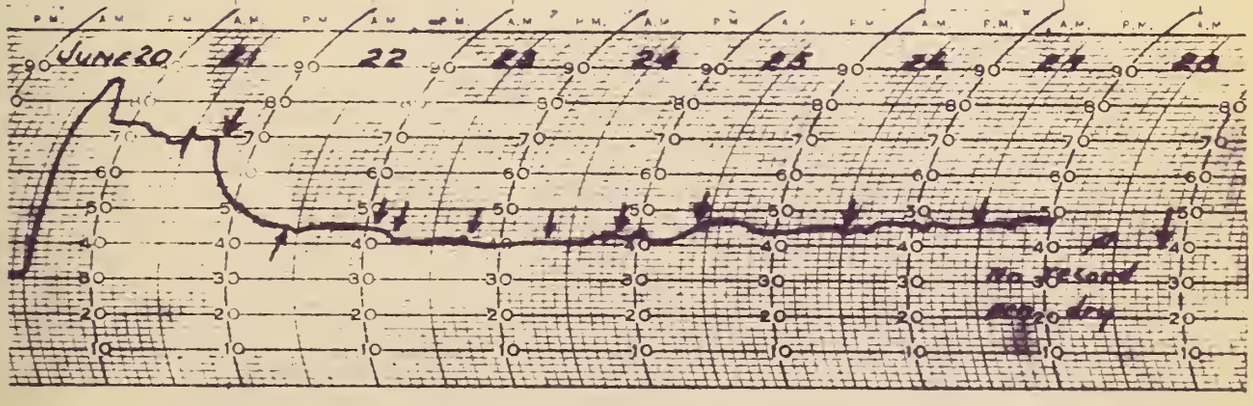
AIR TEMPERATURE UNDER FLOOR RACKS

DOORWAY CENTERLINE

CAR A REX 6554 1% SALT PLUS 1000 LBS DRY ICE JUNE 20-27, 1949



6-21	6-22	6-23	6-24	6-25	6-26	6-27	
INITIAL ICE 2:45 PM	REICE 10:25 AM LOADED 1:30 to 5:00 P	REICE 1:30 A DEPART 4:30 A REICE 5:15 P	REICE 7:00 A 8:00 P	REICE 10:00 A	REICE 12:30 P ARRIVE JERSEY CITY 8:30 P	UNLOADED 12:30 to 3:30 A	6-28
						REICE 11:30 A	UNLOADED 8:30 P



CAR B REX6362 1% SALT